Principles of the

Quantum Theory of Gravity- "QTG".

By

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Abstract

This work challenges current science's conservative thinking and resistance to new ideas and seeks to establish a new frontier for physics, demonstrating the cause of gravity and its relation to time. This involves the introduction of a new concept of time, which underpins and gives coherence to the discussion of gravity, and which is the principal tool that will enable us to unify the Theory of Relativity and Quantum Mechanics.......

.....Our initial postulate was that gravity is the result of the relative difference between the Coulomb force (or centripetal) and the centrifugal force within atoms, caused by the inertia of the electron cloud, as established by the principles of relativity. This difference is a relative force that does not possess mass: after all the electrical charges are neutralized, we have a residual force representing an acceleration from the reference point of the nucleus.......

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1. Introduction

This work challenges current science's conservative thinking and resistance to new ideas and seeks to establish a new frontier for physics, demonstrating the cause of gravity and its relation to time. This involves the introduction of a new concept of time, which underpins and gives coherence to the discussion of gravity, and which is the principal tool that will enable us to unify the Theory of Relativity and Quantum Mechanics.

In certain ways, the ideas described here are in accordance with the Uncertainty Principle, which forms the basis of Quantum Mechanics. Quantum Mechanics is a mathematical formalism developed on the basis of experimentation and observation, allowing the behavior of subatomic particles to be interpreted and analyzed with a high level of precision. Many great physicists nonetheless believe that there the theory must be fundamentally flawed.

In order to assimilate the ideas set out here, it is essential to patiently follow them in their logical sequence. Understanding the different parts in isolation will not lead to a full grasp of the theory: only as a whole will it be comprehensible.

A certain degree of repetition is inevitable in the interests of clarity, although perhaps at the cost of greater elegance. In order to better illustrate the quantities involved and their small differences, equations have been used wherever possible and/or necessary.

As the work proceeds, it will become clear that the subtle connection that brings together the Theory of Relativity and Quantum Mechanics depends on an understanding of how atoms generate gravity and time. Many issues not previously understood, or at best poorly explained, find a satisfactory solution in this theory.

2. What is Gravity?

What is gravity? What is its cause or source? Many minds have attempted to solve this ancient puzzle, but no one has yet been fully successful. For Newton, the force of gravity was merely a function of masses and the distance between them. For Einstein, gravity caused a deformation of the space-time continuum. On this basis, he developed a highly complex algebra that merely describes it geometrically. The majority of studies to date explain only the effects of gravity and not its nature.

The unification of gravity with electricity has been a challenge for many great physicists of the last century. Einstein dedicated almost 35 years to the problem without success, while, in 1968, Dirac suggested that it would not be possible to unify the fundamental forces.

There is now a large body of evidence to suggest a strong connection between – and perhaps a common fundamental origin of – electromagnetism and gravity, as exemplified by an innovative experiment presented at the recent meeting of the American Astronomical Society. Carried out by the University of Missouri – Columbia and the National Radioastronomy Observatory, it used precise measurements to show that gravity is propagated at the same velocity as light.

The relationship between gravity and electricity is also demonstrated by the fact that both obey the inverse square law, despite the immense differences in their relative intensities and distances. This work demonstrates both the origin of this relationship and the reason for these differences.

Further evidence is derived from Einstein's Theory of Relativity, and is based on the principle of the equivalence of inertial and gravitational mass, whereby both experience the same acceleration in a gravitational field, with immense precision. This theory shows that gravity and inertia are the same thing, because both act on a body in the same manner, with their forces proportional to the mass of the body. It can thus be acknowledged that gravity and inertia have a similar origin. It is important to remember that the latter results from a very common phenomenon: the application of a force to a massive body.

The question of gravity can thus be answered through the two facts presented here: gravity is an inertia and is caused by an electromagnetic force of nuclear origin. The evidence also shows that the source or cause of gravity is the relative difference between the electrostatic and centripetal forces within atoms. We will see that the origin of these differences lies in the relativistic motion of electrons and the time reference they adopt.

In order to understand the workings of gravity, we must understand the origin and workings of time and the connection between time and gravity. We must therefore find a physical interpretation that better matches observed phenomena, replacing the Uncertainty Principle with the Temporal Uncertainty Principle as the factor of imprecision in the behavior of subatomic particles. Under the Temporal Uncertainty Principle, a particle is always out of phase with the present or with its local time reference. For any observer at any moment, there will be a slight temporal dislocation either towards the past or towards the future, resembling a sine curve when visualized in two dimensions, or a spiral in three dimensions, in both cases centered on the x-axis, which represents the atom's local "present" or local time reference.

Gravity is generated only when an atom is found in a gravitational field, without which there can be no temporal reference, this being defined by the presence of at least one other atom. The beginning of time thus occurred as of the existence of the second atom in the universe. The gravity generated also depends on the intensity of the gravitational field, hence the expression that "gravity gravitates".

Time passes at different rates in different locations in the universe according to the intensity of local gravitational potential, a property exhaustively tested and demonstrated by the Theory of General Relativity. Adopting time as the factor of imprecision, the same atom under the influence of gravitational fields of different intensities will experience time passing at different rates: the sensation of the atom's mass or gravity will also be different in these different locations. This variation will be extremely small, to the point that it cannot be calculated with scientifically acceptable precision, but its existence is sufficient to explain a number of cosmic phenomena not previously understood, such as dark matter and the gravitational anomalies experienced by deep space probes.

On the basis of the above, we can disregard the controversial Mach Principle, which establishes that the inertial and gravitational properties of matter are somehow linked to the existence of all of the matter in the universe. We can also disregard the influence of distant stars in the definition of an atom's local time reference: the behavior of the water in Newton's famous bucket experiment (How does the water know it is in rotation? In rotation with respect to what?) can be explained perfectly well if we consider that gravity is generated by the atoms. In this case, the reference will be the atom itself accelerated in relation to the others, because each atom is a source of gravity-time and therefore a temporal reference: a collection of such references defines a local time reference.

All the intricate and complex philosophy surrounding the difficulty of explaining relative or absolute acceleration is resolved when we refer the present or local time reference to the nucleus of the atom. It is in the dependence of inertia and gravity on the local time reference that we find the explanation for the question of the inertial reference system: the rate of time experienced by the observer will define what is observed.

In this way, we can regard gravity not as one of the four fundamental forces, but as a relative difference between known interactions: electromagnetism, the strong force and the weak force. The following chapters will demonstrate how gravity can be found in atoms and the importance of time.

3. Temporal dilation of the electron of the hydrogen atom

One important result of the postulates of the Theory of Relativity is the relativistic nature of simultaneity. It has been shown experimentally that time progresses at different rates at reference points in relative motion. The relativity of time means that a given pair of events will occupy different time intervals for different observers. If we adopt the Bohr atomic model, the velocity of an electron in orbit around a nucleus will mean that it experiences temporal dilation in relation to that nucleus. In order to determine this dilation, we must establish the velocity of the electron, thus entering in conflict with the Uncertainty Principle, which establishes that a particle does not have a well-defined simultaneous position and momentum. It will be shown that the imprecision of the present time of the particle – the Temporal Uncertainty Principle – can take the place of the Uncertainty Principle.

Considering Heisenberg's formulation of imprecision of position and momentum, we have:

$$\Delta x \, . \, \Delta p \; \geq \; \frac{\hbar}{2} \qquad \left[\frac{kg.m^2}{s} \right] \qquad Eq.\ 01$$

Where: **ħ** is Planck's constant divided by **2π**

= $1.054572669125101932 \times 10^{-34}$ kg.m^2/s,

Δx is the imprecision of position [m], and

Δp is the imprecision of momentum [kg.m/s].

Limiting the imprecision of the electron's position to the diameter of the atom, we have:

$$2 \, . \, \Delta x \; = \; \left| \pm r_{Bohr} \right| = \; r_{Bohr} \qquad [\, m \,] \qquad Eq.\ 02$$

So the imprecision of momentum is:

$$\Delta p \; \geq \; \frac{\hbar}{r_{Bohr}} \qquad \left[\frac{kg.m}{s} \right] \qquad Eq. 03$$

Where $\mathbf{r}_{\text{Bohr}}$ is the Bohr radius of the atom [m].

As every natural physical system tends towards its most stable state, an atom's size is optimized so as to minimize its total energy. We can therefore simplify the calculation by using the mass of the electron instead of the reduced mass, calculating the potential energy "**U**", as follows:

$$U = -\frac{q^2}{4.\pi.\varepsilon_0.r_{Bohr}} = -\frac{K_{Coulomb}.q^2}{r_{Bohr}} \qquad \left[J \;\; or \;\; \frac{kg.m^2}{s^2} \right] \qquad Eq.04$$

Where **q** is the elementary electrical charge = 1.60217733 x 10^{-19} A.s,

and

$\mathbf{K}_{Coulomb}$ is Coulomb's constant, determined by:

$$K_{Coulomb} = \frac{1}{4.\pi.\varepsilon_o} = 9.987551787368572122x10^9 \qquad \left[1Coulomb \;\; or \;\; \frac{kg\ m^3}{A^2.s^4} \right] \qquad Eq.05$$

$\boldsymbol{\varepsilon_0}$ is the electrical permissivity of a vacuum

= 8.85418781762 x10^{-12} $Coulomb^2/N.m^2$ or $(A^2.s^4)/(kg.m^3)$

Using equation 3, we can calculate the kinetic energy "**K**" as follows:

$$K = \frac{p^2}{2.m_{electron}} = \frac{(\Delta p)^2}{2.m_{electron}} = \frac{\hbar^2}{2.m_{electron}.r_{Bohr}{}^2} \qquad \left[J \;\; or \;\; \frac{kg.m^2}{s^2} \right] \qquad Eq.06$$

Where $\mathbf{m}_{electron}$ is the relativistic mass of the electron [kg].

For the total energy of the atom, we thus have:

$$K + U = \frac{\hbar^2}{2.m_{electron}.r_{Bohr}{}^2} - \frac{q^2}{4.\pi.\varepsilon_0.r_{Bohr}} \qquad \left[J \;\; or \;\; \frac{kg.m^2}{s^2} \right] \qquad Eq.07$$

To find the atom in its most stable state, we must find the Bohr radius that minimizes total energy. We must therefore take the derivative of the energy in relation to the Bohr radius.

$$\frac{\partial(K+U)}{\partial r_{Bohr}} = -\frac{2.\hbar^2}{2.m_{electron}\, r_{Bohr}^{\;3}} + \frac{q^2}{4.\pi.\varepsilon_0.r_{Bohr}^{\;2}} = 0 \qquad Eq08$$

We now have an equation relating the Bohr radius to the relativistic mass of the electron:

$$r_{Bohr} = \frac{4.\pi.\varepsilon_0.\hbar^2}{m_{electron}.q^2} = \frac{\hbar^2}{K_{Coulomb}.q^2.m_{electron}} \qquad [m] \qquad Eq.\ 09$$

Returning to the formulation of the Uncertainty Principle and separating the imprecision of momentum into its two parts, we have:

$$\Delta x\ .\ \Delta p \ \geq \ \frac{\hbar}{2} \qquad ou \qquad \Delta x\,.\,\Delta\left(m_{electron}\,.\,v_{electron}\right) \ \geq \ \frac{\hbar}{2} \qquad \left[\frac{kg.m^2}{s}\right] \qquad Eq.\ 10$$

Where $\mathbf{v}_{electron}$ is the velocity of the electron.

Limiting the imprecision of the mass of the electron to its relativistic mass, we have:

$$\Delta m_{o\,electron} \ = \ m_{electron} \qquad [\ kg\ ] \qquad Eq.\ 11$$

Introducing the form for the relativistic mass of the electron yields:

$$m_{electron} = \frac{m_{o\,electron}}{\sqrt{1-\dfrac{v_{electron}^{\;2}}{c^2}}} \qquad [kg\ ] \qquad Eq.\ 12$$

Where $\mathbf{c}$ is the velocity of light = 2.99792458×10^8 m/s,

$\mathbf{m}_{\mathbf{o}\ electron}$ is the rest mass of the electron = $9.1093897 \times 10^{-31}$ kg.

Introducing the relativistic form of the Bohr's radius, we have:

$$r_{Bohr} = \frac{\hbar^2 . \sqrt{1 - \frac{{v_{electron}}^2}{c^2}}}{K_{Coulomb} . q^2 . m_{o\,electron}} \qquad [m] \qquad Eq.\ 13$$

Substituting equations 2, 11, 12 and 13 into equation 10, we obtain the following expressions for the velocity of the electron:

$$v_{electron} \geq \frac{\hbar}{m_{electron} . r_{Bohr}} \quad or \quad \frac{K_{Coulomb} . q^2}{\hbar} \qquad \left[\frac{m}{s} \right] \qquad Eq.14$$

Resolving, we obtain:

$$v_{Elétron} = 2.187691396772981423978587403815416356454413295889460570908 29 x10^6 \frac{m}{s}$$

This is the velocity of the electron for the most stable state of the hydrogen atom. We can call it "the velocity of the electron with no gravity-time influence beyond its own atom". As will be shown, it is the velocity of the electron in a universe that consists of a single hydrogen atom.

In order to determine the Bohr radius, we must again ignore the impositions of the Uncertainty Principle, as a result of the impossibility of a particle having well defined position and momentum at a given instant. Solving equation 13, we find:

$\mathbf{r}_{\mathrm{Bohr}} = 5.29163167614727303014376 \text{ x } 10^{-11}$ m

We can verify that this $\boldsymbol{\upsilon}_{\mathrm{electron}}$ and this $\mathbf{r}_{\mathrm{Bohr}}$ are in accordance with the condition for stability of the electron established by Quantum Mechanics, where the nuclear forces (Coulomb force and centripetal force) must be equal. Solving partially, we have the following expressions for the Coulomb force and for the centripetal force:

$$F_{Coulomb} = \frac{K_{Coulomb} . q^2}{{r_{Bohr}}^2} \qquad \left[\frac{kg.m}{s^2} \ or \ N \right] \qquad Eq.15$$

$$F_{Centripetal} = \frac{m_{electron}.v_{electron}^{2}}{r_{Bohr}} \qquad \left[\frac{kg.m}{s^2} \; or \; N\right] \qquad Eq.16$$

Substituting the relativistic expressions for the mass and radius of the electron (equations 12 and 13), we obtain the following for the Coulomb force:

$$F_{Coulomb} = \frac{K_{Coulomb}.q^2}{\left(\dfrac{\hbar^2.\sqrt{1-\dfrac{v_{electron}^{2}}{c^2}}}{K_{Coulomb}.q^2.m_{o\,electron}}\right)^2} = \frac{K_{Coulomb}^{3}.q^6.m_{o\,electron}^{2}}{\hbar^4.\left(\sqrt{1-\dfrac{v_{electron}^{2}}{c^2}}\right)^2} \qquad Eq.17$$

For the centripetal force, we have:

$$F_{Centripetal} = \left(\frac{m_{o\,electron}}{\sqrt{1-\dfrac{v_{electron}^{2}}{c^2}}}\right)\frac{v_{electron}^{2}}{\left(\dfrac{\hbar^2.\sqrt{1-\dfrac{v_{electron}^{2}}{c^2}}}{K_{Coulomb}.q^2.m_{o\,electron}}\right)} = \frac{v_{electron}^{2}.K_{Coulomb}.q^2.m_{o\,electron}^{2}}{\hbar^2.\left(\sqrt{1-\dfrac{v_{electron}^{2}}{c^2}}\right)^2} \qquad Eq.18$$

Regrouping, we find:

$$F_{Coulumb} = \frac{K_{Coulomb}^{3}.q^6.m_{o\,electron}^{2}}{\hbar^4.\left(\sqrt{1-\dfrac{v_{electron}^{2}}{c^2}}\right)^2} = F_{Centripetal} = \frac{v_{electron}^{2}.K_{Coulomb}.q^2.m_{o\,electron}^{2}}{\hbar^2.\left(\sqrt{1-\dfrac{v_{electron}^{2}}{c^2}}\right)^2} \qquad Eq.19$$

Simplifying and solving, we find exactly the same relation for the velocity of the electron as in equation 14, demonstrating that this relation also yields equilibrium of the nuclear forces using the relativistic values.

Electrons in orbit around an atomic nucleus undergo temporal dilation as a result of their velocity (according to the Special Theory of Relativity) or as a result of their acceleration (according to the General Theory of Relativity). We can calculate the value as follows:

Considering an arbitrary time variation of 1 second in the nucleus, we have:

Time variation at nucleus = $\Delta_{\text{Time Nucleus}}$ = 1 second.

From the General Theory of Relativity, we have the following relation for time change in the electron cloud ($\Delta_{\text{Time Electroncloud}}$):

$$\Delta_{\textit{Time Electron cloud}} = \frac{\Delta_{\textit{Time Nucleus}}}{\sqrt{1-\frac{v_{electron}^{2}}{c^{2}}}} = 1.000026626743938......seg. \qquad Eq.20$$

Under both the General and Special Theories of Relativity, we arrive at the same result, because both lead to exactly the same formulation in a rotating system. We thus have a time difference of:

$\boldsymbol{\Delta}_{\text{Time}}$ = $\boldsymbol{\Delta}_{\text{Time Electron}} - \boldsymbol{\Delta}_{\text{Time Nucleus}}$ = 26.63....μs.

For the sake of curiosity, and to illustrate the work with more practical examples, let us examine the distance represented by this time dilation of the electron in relation to the nucleus:

Distance traveled = $\boldsymbol{\Delta}_{\text{Time}}$ x $\boldsymbol{\upsilon}_{\text{electron}}$ = 58.25...m.

In terms of orbits around the nucleus, this distance is equivalent to:

$$No.\ Orbits = \frac{\Delta_{Time} \cdot v_{electron}}{2.\pi.r_{Bohr}} = \ 1.72\ x10^{11}\ orbits \qquad Eq.\ 21$$

With each second that passes, this electron is going 26.63..μs out of phase with the local time of the nucleus, or with the external time reference, if we take the nucleus to be the only time reference external to the electron.

Working from the limitation of the speed of light, we can verify that all the information received at our point of reference in the present is derived from the past. In other words, everything around us, irrespective of the distance, is in the past, which is to say that from any other point, in relation to everything else, our point of reference is in the future. One of the properties of atoms, therefore, is that time passes more slowly in the electron cloud, polarizing the time of the nucleus towards the future and thus establishing a direction for time. This could be described as being one of the pillars of the Quantum Theory of Gravity.

4. The Temporal Uncertainty Principle

Chapter 3 demonstrated that, due to the relativistic nature of simultaneity, time passes at different rates with respect to points of reference in relative motion. It has also been demonstrated theoretically and experimentally that one of the consequences of the General Theory of Relativity is that time also passes at different rates in locations with different gravitational potentials or subject to different inertias. For the subatomic world, where inertias are also present, we should therefore accept a further phenomenon, which introduces the coexistence of the past and the future in the same environment: temporal uncertainty.

Given the existence of different rates of time in the atom, we must admit that, when examined in isolation, an atom must have its own temporal system and possess a location, which is in equilibrium with its external time reference. This point of reference is the nucleus, or a location very close to it: it is the geometric center of the atom and concentrates the greater part of its mass, thus connecting the atom with the external time reference.

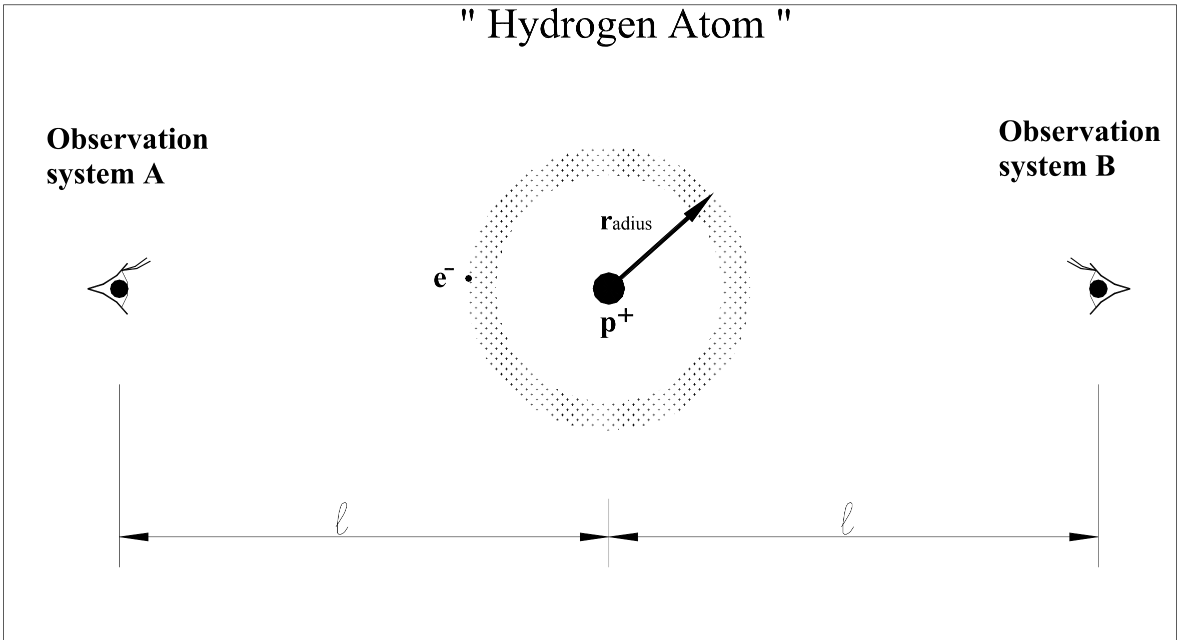

Figure 1

In heavier atoms, this point of reference can be well defined, due to the more homogeneous distribution of electrons in the electron cloud and the greater concentration of mass (energy) in the nucleus; in the lighter atoms it oscillates considerably. The double slit experiment thus reveals interference characteristics with light atoms as it does with photons and electrons, as will be seen in chapter 12,.

Figure 1 describes an imaginary experiment, which should be imagined in three dimensions, consisting of a hydrogen atom and two observation systems, A and B, located on opposite sides of it. The observation system is to be understood as an entity consisting of one or more atoms that establish among themselves a local time reference independent of the individual temporal oscillations of the atoms and their parts, within the conditions established by the principles of relativity.

At a given instant, the components of the hydrogen atom emit some kind of signal, which is propagated at the velocity of light. For observation system A, the signal from the electron arrives at time $t_e = (\ell - \text{radius})/c$, while the signal from the nucleus arrives at $t_p = \ell / c$. It is clear that $t_e < t_p$, which is to say that, for observation system A, the electron is in the future, because the signal arrives before the reference signal from the nucleus. In this case, the electron is in the future in relation to the local time reference. For observation system B, the signal from the electron arrives after the reference signal, indicating that the electron is in the past in relation to the local time reference.

Each observation system clearly perceives a different reality for the atom. It can therefore be concluded that the electron oscillates between the past and the future in a manner that can be represented in three dimensions as a spiral and in two dimensions as a sine curve, as shown in figure 2. Each observer will also perceive a different sine curve.

Time Reference of Electron x Time Reference of Nucleus

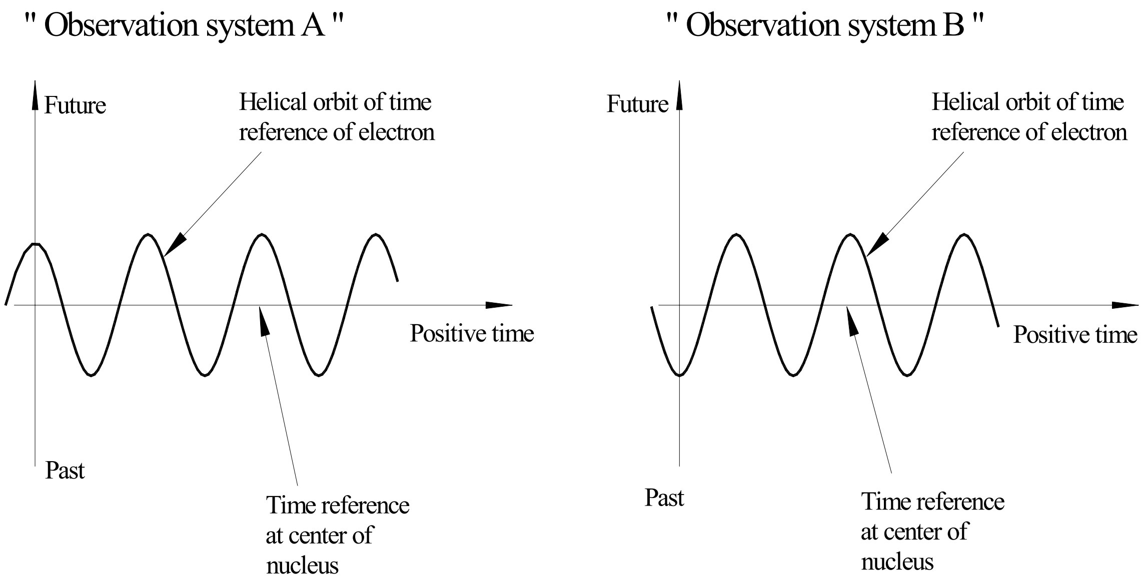

Figure 2

It can be seen that these time differences are very small, and are directly proportional to the size of the atom. For the sake of curiosity, we can calculate the difference:

$$\Delta Time \leq \frac{\pm r_{Bohr}}{c} = \pm 1{,}7651.10^{-19} \quad [\,s\,] \qquad Eq.22$$

It has been confirmed experimentally that when an electron is observed escaping from an atom, it is obliged to do so from the nucleus, even though this is a location where it cannot be. This is practical confirmation that the nucleus is the connection between the atom's temporal system and the external time reference.

5. The gravitational potential of the hydrogen atom

The General Theory of Relativity states that atoms and electromagnetic waves vibrate or oscillate differently in locations with different gravitational potentials. In other words, a "clock" in a region of low gravitational potential, close to a large mass, will mark time more slowly than a clock located further from this mass, in a region of high gravitational potential.

Let us imagine a truly minimal universe consisting of a single hydrogen atom, so as to determine to what extent the classical gravity of its mass affects the time of its orbiting electron. The proton nucleus is the center of mass and the gravitational source of the system. The first step is to calculate the gravitational potential in the electron cloud:

$$\Phi_{Electroncloud} = -\frac{K_{Gravitational} \cdot m_{o\,proton}}{r_{Bohr}} \quad \left[\frac{m^2}{s^2}\right] \qquad Eq.23$$

Where $\mathbf{\Phi}_{Electroncloud}$ is the gravitational potential in the electron cloud [m^2/s^2],

$\mathbf{K}_{Gravitational}$ is the Universal Gravitational Constant,

= 6.672590×10^{-11} $m^3/(Kg.s^2)$, and

$\mathbf{m}_{o\ Proton}$ is the rest mass of the proton

= 1.6726231 x 10-27 kg.

Substituting the relativistic form of the atomic radius (from equation 13) into equation 23 and using the velocity of the electron from equation 14, we get:

$$\Phi_{Electroncloud} = -\frac{K_{Gravitational} \cdot m_{o\,proton} \cdot K_{Coulomb} \cdot q^2 \cdot m_{o\,electron}}{\hbar^2 . \sqrt{1 - \frac{v_{electron}^2}{c^2}}} \quad \left[\frac{m^2}{s^2}\right] \qquad Eq.24$$

Solving equation 24, the result is:

$$\Phi_{Electoncloud} = -2.109071773683248855971671633349243115482710833247480116446 1 x 10^{-27} . \frac{m^2}{s^2}$$

An object in uniform circular motion or in rotation – in this case, an electron in electrostatic suspension in a hydrogen atom – is also under constant acceleration. Within the volume of this atom, from the reference point of the electron, we have a region of higher gravitational potential at the center and a lower gravitational potential in the electron cloud. We therefore have a behavior that is inverse to that of a body in a real gravitational orbit. In order to determine the change of gravitational potential to which the electron is subject, we must calculate the following:

$$\Delta\Phi_{H-atom} = \Phi_{Nucleus} - \Phi_{Electron} \qquad \left[\frac{m^2}{s^2}\right] \qquad Eq.25$$

Where $\mathbf{\Delta\Phi}_{\text{H-atom}}$ is the change in gravitational potential in the system $[m^2/s^2]$,

$\mathbf{\Phi}_{\text{Nucleus}}$ is the gravitational potential at the nucleus $[m^2/s^2]$, and

$\mathbf{\Phi}_{\text{Electron}}$ is the gravitational potential at the electron $[m^2/s^2]$.

We can now determine the gravitational potentials:

$$\Phi_{Nucleus} = 0{,}0 \qquad e \qquad \Phi_{Electron} = -v_{electron}^{\;2} \qquad \left[\frac{m^2}{s^2}\right] \qquad Eq.26$$

The change in gravitational potential in the system is therefore:

$$\Delta\Phi_{H-atom} = 0{,}0 - v_{electron}^{\;2} = -v_{electron}^{\;2} \qquad \left[\frac{m^2}{s^2}\right] \qquad Eq.27$$

Here we have two different circumstances that influence the time of the electron: the first is the mass of the nucleus, which places the electron under the influence of a gravitational potential, and the second is the inertia generated by the circular motion or centripetal acceleration, as seen in chapter 3, where the temporal dilation was determined according to the postulates of the General and Special Theories of Relativity. We must now determine the real velocity of the electron that will compensate for the circumstances introduced by the logic of relativity. From what we have seen, this value must logically be **larger than** those obtained in equation 14.

Adopting the gravitational potential in the electron cloud from the classical formulation above as being the change in gravitational potential in this system, we have:

$\boldsymbol{\Phi}_{\text{Electroncloud}} = \boldsymbol{\Delta\Phi}_{\text{H-atom}} = \boldsymbol{\Delta\Phi}_{\text{Electroncloud}}$

From equation 25, we have:

$$\Delta\Phi_{Electroncloud} = v1_{electron}{}^{2} - v_{electron}{}^{2} \qquad \left[\frac{m^2}{s^2}\right] \qquad Eq.28$$

The velocity of the electron is therefore $\boldsymbol{\upsilon}1_{\text{electron}}$, as follows:

$$v1_{electron} = \sqrt{v_{electron}{}^{2} + \Delta\Phi_{Electroncloud}} \qquad \left[\frac{m^2}{s^2}\right] \qquad Eq.29$$

Solving, we find:

$$v1_{electron} = \pm 2.187691396772981423978587403815416356454895340097000182149 70\, x 10^{6}\,\frac{m}{s}$$

We can call this the "the velocity of the electron modulated only by the classical gravity of the mass of the proton". The $\pm$ sign indicates that the motion of the electron can be in either direction. The difference between the velocities $\boldsymbol{\upsilon}1_{\text{electron}}$ and $\boldsymbol{\upsilon}_{\text{electron}}$ is small:

$$\Delta v_{electron} = v1_{electron} - v_{electron} = 4.820442075396112414..x10^{-34} \quad \left[\frac{m}{s}\right] \qquad Eq.30$$

We can obtain the same result calculating in another manner, using the central forces:

$$F_{Coulomb} + F_{Gravitational} = F_{Centripetal} \qquad \left[\frac{kg.m}{s^2}\right] \qquad Eq.31$$

The complete formula is as follows:

$$\frac{K_{Coulomb}.q^2}{r_{Bohr}{}^{2}} + \frac{K_{Gravitational}.m_{o\,proton}.m_{o\,electron}}{r_{Bohr}{}^{2}} = \frac{m_{o\,electron}.v2_{electron}{}^{2}}{r_{Bohr}} \qquad \left[\frac{kg.m}{s^2}\right] \qquad Eq.\ 32$$

Substituting the relativistic mass and radius of the electron (equations 12 and 13) and the new velocity ($\upsilon 2_{electron}$) into equation 28, we have:

$$K_{Coulomb}.q^2 + \frac{K_{Gravitational}.m_{o\ proton}.m_{o\ electron}}{\sqrt{1-\frac{v2_{electron}{}^2}{c^2}}} = \frac{\hbar^2.v2_{electron}{}^2}{K_{Coulomb}.q^2} \qquad \left[\frac{kg.m}{s^2}\right] \qquad Eq.33$$

Solving for $\upsilon 2_{electron}$, we have:

$$v2_{electron} = \pm 2.1876913967729814239785874038154163564548953400970001821 4970\ x10^6\ \frac{m}{s}$$

According to equation 30 the difference is:

$$\Delta v_{electron} = v2_{electron} - v_{electron} = 4.820442075396112414..x10^{-34} \quad \left[\frac{m}{s}\right] \qquad Eq.30$$

Hence $\upsilon 1_{electron} = \upsilon 2_{electron} > \upsilon_{electron}$, demonstrating that the velocity of the electron in the electron cloud of a single hydrogen atom is increased as a result of the classically defined gravity of the nucleus.

6. The gravity of the hydrogen atom

Our initial postulate was that gravity is the result of the relative difference between the Coulomb force and the centripetal force within atoms, caused by the centrifugal inertia of the electron cloud, as established by the principles of relativity. This difference is a relative force that does not possess mass: after all the electrical charges are neutralized, we have a residual force representing an acceleration from the reference point of the nucleus.

We can determine the differences experienced by the particles in our universe of a single hydrogen atom when we change the point of reference.

With the electron as the point of reference, we should total the central forces, as seen in equation 31. Here we adopt the same formulation:

$$F_{Coulomb} + "F_{Gravitational}" = F_{Centrípetal} \quad \left[\frac{kg.m}{s^2}\right] \qquad Eq.31$$

As was shown, this led to an increase in the velocity of the electron.

Taking the special case where the nucleus is the point of reference, the classical gravity of the nucleus increases the velocity of the electron in the electron cloud, according to the General Theory of Relativity, unbalancing the atomic forces. The stability required by Quantum Mechanics must be maintained by subtracting exactly this difference in the velocity of the electron, which is achieved by inverting the formulation in equation 31:

$$F_{Coulomb} = F_{Centrípetal} + "F_{Gravitational}" \quad \left[\frac{kg.m}{s^2}\right] \qquad Eq.34$$

We can thus recalculate the velocity of the electron ($\upsilon 3_{electron}$) as follows:

$$\frac{K_{Coulomb}.q^2}{{r_{Bohr}}^2} = \frac{m_{o\,electron}.{v3_{electron}}^2}{r_{Bohr}} + \frac{K_{Gravitational}.m_{o\,proton}.m_{o\,electron}}{{r_{Bohr}}^2} \quad \left[\frac{kg.m}{s^2}\right] \quad Eq.35$$

Substituting the relativistic form of the atomic radius (equation 13) and the velocity obtained in equation 14 into equation 35 and simplifying, we have:

$$K_{Coulomb}.q^2 = \frac{\hbar^2.{v3_{electron}}^2}{K_{Coulomb}.q^2} + \frac{K_{Gravitational}.m_{o\,proton}.m_{o\,electron}}{\sqrt{1-\frac{{v3_{electron}}^2}{c^2}}} \qquad Eq.36$$

Solving for $\upsilon 3_{electron}$, we find the new velocity:

$$v3_{electron} = \pm\, 2.1876913967729814239785874038154163564539312516819209596669..x10^6\,\frac{m}{s}$$

We can call this the “velocity of the electron modulated by the gravitational potential”. This is the velocity the electron must have in order to compensate for classical gravity and to balance the atomic forces for the nuclear point of reference.

We can now calculate the Coulomb force for this velocity:

$$F_{Coulomb} = \frac{K_{Coulomb}.q^2}{\left(\frac{\hbar^2.\sqrt{1-\frac{{v3_{electron}}^2}{c^2}}}{K_{Coulomb}.q^2.m_{o\,electron}}\right)^2} \quad \left[\frac{kg.m}{s^2}\right] \quad Eq.37$$

This yields:

$$F_{Coulomb} = 8.2391679474650620648881635730386765479791629460492917138 54\, x10^{-8}\,\frac{kg.m}{s^2}$$

We can now calculate the centripetal force for this velocity:

$$F_{Centripetal} = \left(\frac{m_{o\,electron}}{\sqrt{1 - \frac{v3_{electron}^{\;2}}{c^2}}} \right) . \frac{v3_{electron}^{\;2}}{\left(\frac{\hbar^2 . \sqrt{1 - \frac{v3_{electron}^{\;2}}{c^2}}}{K_{Coulomb} . q^2 . m_{o\,electron}} \right)} \quad \left[\frac{kg.m}{s^2} \right] \quad Eq.38$$

This yields:

$$F_{Centripetal} = 8.2391679474\,6506206488\,8163573038\,6765479755\,3204711182\,7270462 \;\; x10^{-8} \frac{kg.m}{s^2}$$

The difference between the Coulomb force and the centripetal force is thus:

$$F_{Coulomb} - F_{Centripetal} = 3.630898937464443391 82.x10^{-47} \frac{kg.m}{s^2}$$

By the classical formulation, we have:

$$F_{Gravitational} = \frac{K_{Gravitational} . m_{o\;proton}}{\left(\frac{\hbar^2 . \sqrt{1 - \frac{v3_{electron}^{\;2}}{c^2}}}{K_{Coulomb} . q^2 . m_{o\,electron}} \right)^2} . \frac{m_{o\,electron}}{\sqrt{1 - \frac{v3_{electron}^{\;2}}{c^2}}} \quad \left[\frac{kg.m}{s^2} \right] \quad Eq.\,39$$

The classical Newtonian equation thus yields the same value for the gravitational force:

$$F_{Gravitational} = 3.6308989374 \;\; 6444339182 \;\; 33356\,.x10^{-47} \frac{kg.m}{s^2}$$

We have seen that, given the principles of relativity and due to the gravitational conditions of the atom, a small variation in the velocity of the electron unbalances the forces such that, when the point of reference is the proton, the Coulomb force is greater than the centripetal force. This difference is the gravitational force. When the point of reference is the electron, the Coulomb force is equal to the centripetal force, ensuring the equilibrium of the system.

Within the atom, the nucleus is the point of external time reference. This residual force acts on the nucleus: it is experienced only by the proton. Being a relative force, it does not possess mass: it thus represents an inertia, which will only be experienced beyond the micro-temporal system under consideration.

The calculations presented here do not reflect reality exactly, but serve merely as a guide. If we take into account that the electron is a particle that can be located at any given instant, the resultant acceleration vector from these forces should possess a direction at that instant. We should therefore presume that the real velocity of the electron should be even less, just as the resultant gravitational force should be greater in reality than that obtained, because we know from the classical calculation that what is obtained is an average of the gravity at the surface.

7. The gravitational anomaly of the NASA Pioneer 10 probe

We will now calculate the influence of the change of gravitational potential on the velocity of the electron of a hydrogen atom that is moved within the solar system from the Earth's orbit (1 AU) to a distance of 50 AU from the sun. In this manner, we can determine the degree to which the sun influences the gravity-time of all the material around it, given that the sun is the dominant mass in the region and thus primarily responsible for the definition of the regional time reference. We can calculate as follows:

$$\Phi_{1AU} = -\frac{K_{Gravitational} . m_{SUN}}{L_{S-T}} \quad \left[\frac{m^2}{s^2}\right] \quad Eq.40$$

Where $\mathbf{\Phi}_{1AU}$ = $\mathbf{\Phi}_{Earth}$ = the gravitational potential on Earth [m^2/s^2],

$\mathbf{m}_{Sun}$ = the mass of the sun = 1.99 x 10^{30} kg, and

$\mathbf{L}_{S\text{-}E}$ = the distance from the Earth to the sun = 1.49 x 10^{11} m.

Solving, we find:

$$\Phi_{1AU} = -8.8760533565419652406417112299465240641711229946524064171123 \; x10^8 . \frac{m^2}{s^2}$$

For a distance of 50 AU, we have:

$$\Phi_{50AU} = -\frac{K_{Gravitational} . m_{SUN}}{L_{S-T}} \quad \left[\frac{m^2}{s^2}\right] \quad Eq.41$$

Where Φ_{50AU} = the gravitational potential at 50 AU [m^2/s^2].

Solving, we find:

$$\Phi_{50AU} = -1.7752106713083930481283422459893048128342245989304812834224 6 \; x10^7 . \frac{m^2}{s^2}$$

The change in gravitational potential at this distance is:

$$\Delta\Phi_{Gravittcional} = \Phi_{50AU} - \Phi_{1AU} \qquad \left[\frac{m^2}{s^2}\right] \qquad Eq.42$$

Solving, we find:

$$\Delta\Phi_{Gravitational} = 8.6985322894111259358288770053475935828877005347593582887701\ x10^8\ \frac{m^2}{s^2}$$

From the General Theory of Relativity, we know that we can calculate the change in temporal frequency for a parallel gravitational field using the following equation:

$$\Delta T_{Time2} = \Delta T_{Time1} \cdot \left(1 + \frac{\Delta\Phi_{Gravitational}}{c^2}\right) \qquad [s] \quad Eq.43$$

Where $\mathbf{\Delta T}_{\text{Time1}}$ is the period of time that passes in location 1 [s], and

$\mathbf{\Delta T}_{\text{Time2}}$ is the period of time that passes in location 2 [s].

In this case, given events separated by a great distance, the gravitational field cannot be considered as parallel, but as concentric, so we have:

$$\Delta T_{Time2} = \Delta T_{Time1} \cdot \sqrt{1 + \frac{\Delta\Phi_{Gravitational}}{c^2}} \qquad [s] \quad Eq.44$$

On this basis, we can derive the formula to determine the change in velocity of the electrons in an atom:

$$\Delta v_{electron2} = \Delta v_{electron1.} \cdot \sqrt{1 + \frac{\Delta\Phi_{Gravitational}}{c^2}} \qquad \left[\frac{m}{s}\right] \qquad Eq.45$$

Where $\mathbf{\Delta \upsilon}_{\text{electron1}}$ is the change in velocity of the electron at location 1 [s], and

$\mathbf{\Delta \upsilon}_{\text{electron2}}$ is the change in velocity of the electron at location 2. [s]

We can use the change in electron velocity obtained from equation 30 at 1 AU:

$$\Delta v_{electron} = 4.820442075396112414 \ x10^{-34} \ \frac{m}{s}$$

$$\Delta v_{electron-50AU} = \Delta v_{electron-1AU} \cdot \sqrt{1 + \frac{\Delta\Phi_{Gravitational}}{c^2}} \quad \left[\frac{m}{s}\right] \quad Eq.46$$

Using the change in gravitational potential, the new change in velocity at 50 AU will be:

Where $\Delta\boldsymbol{v}_{\text{electron-}\mathbf{1}\text{AU}}$ is the change in velocity of the electron at 1 AU [s], and

"$\Delta\boldsymbol{v}_{\text{electron-}\mathbf{50}\text{AU}}$ is the changed in velocity of the electron at 50 AU [s].

Solving, we find:

$$\Delta v_{Elétron-50UA} = \ 4.820442098723249733 \ x10^{-34} \ \frac{m}{s}$$

We can use the velocity of the electron in its fundamental state, with no gravitational influence, as determined in equation 3:

$$v_{electron} = \ 2.1876913967729814239785874038154163564544132958894605709082 9 \ x10^{6} \ \frac{m}{s}$$

The velocity of the electron at 50 AU is calculated as in equation 30:

$$v_{electron-50.AU} = v_{electron} - \Delta v_{electron-50AU} \quad \left[\frac{m}{s}\right] \quad Eq.48$$

Solving, we find:

$$v_{electron-50.AU} = \ 2.18769139677298142397858740381541635645393125167958824593 50 \ x10^{6} \ \frac{m}{s}$$

We can call this "the velocity of the electron at 50 AU from the sun, modulated by the gravitational potential of the time reference location".

At a distance of 50 AU, this velocity generates a gravity of:

$$F_{Gravit-50AU} = \frac{K_{Coulomb}.q^2}{\left(\frac{\hbar^2.\sqrt{1-\frac{v_{electron}^{\ 2}}{c^2}}}{K_{Coulomb}.q^2.m_{o\,electron}}\right)^2} - \left(\frac{m_{o\,electron}}{\sqrt{1-\frac{v_{electron}^{\ 2}}{c^2}}}\right).\frac{v_{electron}^{\ 2}}{\left(\frac{\hbar^2.\sqrt{1-\frac{v_{electron}^{\ 2}}{c^2}}}{K_{Coulomb}.q^2.m_{o\,electron}}\right)} \left[\frac{kg.m}{s^2}\right] \quad Eq.48$$

Solving, we find:

$$F_{Gravit-50AU} = 3.630898955035130225 \ x10^{-47} \frac{kg.m}{s^2}$$

This can be compared to the gravity at an orbit of 1 AU:

$$F_{Gravit-1.AU} = 3.630898937464443392 \ x10^{-47} \frac{kg.m}{s^2}$$

The difference is:

$$F_{Gravit-50.AU} - F_{Gravit-1.AU} = 1.7570686833 \ x10^{-55} \frac{kg.m}{s^2} \quad Eq.49$$

That is to say that a body with mass of 1000 kg at an orbit of 1 AU will have a greater mass at an orbit of 50 AU:

$$m_{50AU} = m_{1AU} \cdot \frac{F_{Gravit-50UA}}{F_{Gravit-1UA}} = 1000.000004839211208 \ kg \quad Eq.50$$

We have a further option for determining the mass, which is:

$$m_{50AU} = m_{1AU} \cdot \sqrt{1+\frac{\Delta\Phi_{Gravitational}}{c^2}} = 1000.0000048392112079 \ kg \quad Eq.51$$

The two methods yield exactly the same result.

We should remember that the universal gravitational constant was determined on Earth, taking into account a great quantity and diversity of atoms. On Earth and in this region of the Solar System, Newton’s laws and the Universal Gravitational Constant should therefore work very well.

We must now calculate the extent to which the mass of the Solar System will influence this mass in the infinite:

$$m_{\infty} = m_{1UA} \cdot \sqrt{1 + \frac{-\frac{K_{Gravitational}.m_{Sun}}{\infty} - \left(-\frac{K_{Gravitational}.m_{Sun}}{1AU}\right)}{c^2}} = 1000{,}0000049\ kg \qquad Eq.52$$

The mass increases, but remains limited at the infinite. This shows that the Universal Gravitational Constant conspires in some way against what would be expected of great distances, suggesting that this constant may not be so reliable, or perhaps that it is not so universal.

Perhaps the problem of dark matter is not that we do not see the missing matter, but that we do not know how to calculate the force of gravity at great distances. Perhaps we do not have dark matter but “dark gravity”.

We can conclude that, as time passes at different rates in different locations in the universe, so the perception of mass should also vary.

8. Gravity and time

No gravity is generated in a universe consisting of just one atom, because the Coulomb force is equal to the centripetal force, as shown in chapter 3. An atom with no external gravitational influence – without the imposition of a temporal condition or local time reference – cannot generate gravity. Why, then, will gravity be generated in the universe of two atoms shown in figure 3? In this case, as described in chapter 4, we will have the formation of a local time reference involving more than one element capable of generating gravity. In this case the centers of the two atoms establish a temporal link, and it is this identification that will influence the systems, disturbing the oscillation of the electrons and establishing a local gravitational potential.

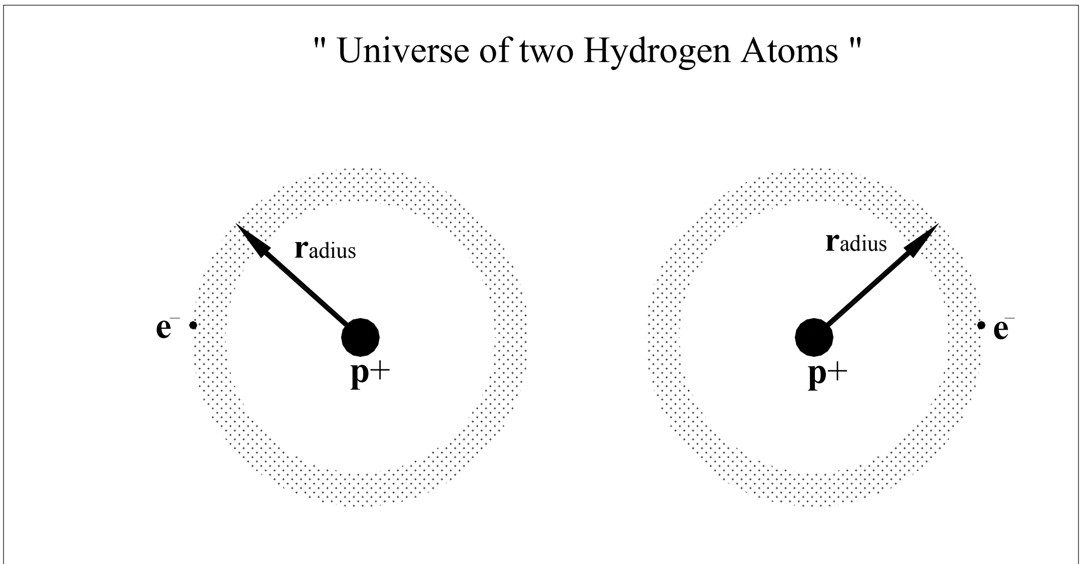

Figure 3

The local gravitational potential affects the temporal functioning of the atom in two ways (see figure 4). Firstly, it forces the atom to experience time at a determined rate, given that two identical atoms with the same characteristics but in different locations will experience time at different rates. Secondly, it alters the velocity of the electron, generating a greater or lesser gravitational force such that there is an increase or reduction in the potential energy. This is accompanied by a corresponding loss or gain in kinetic energy, as shown in chapter 3, as the atom optimizes its size so as to minimize its total energy.

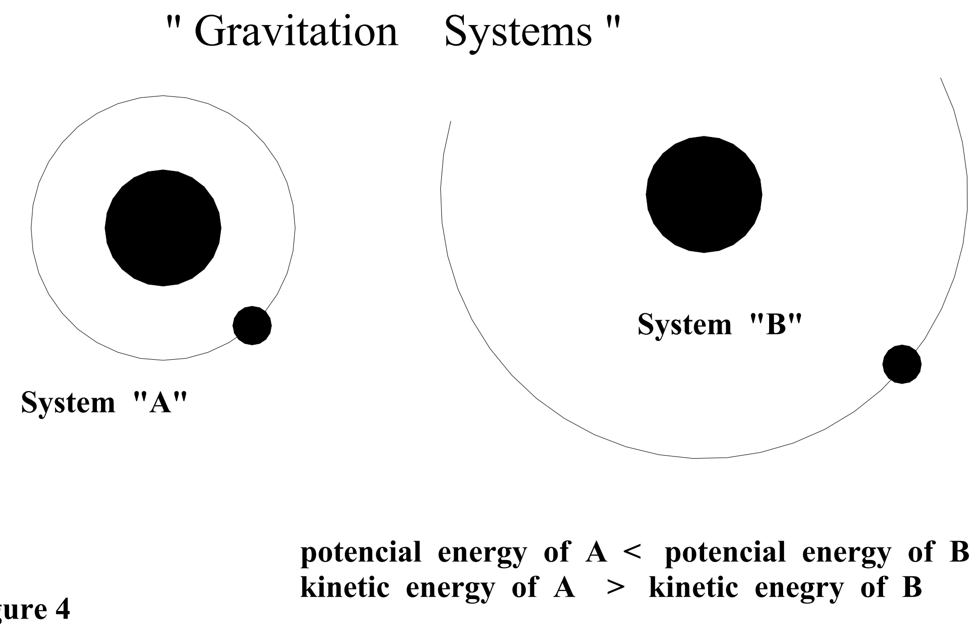

Figure 4

If we analyze the formulas, we can see more simply how the radius of the atom and the velocity of the electron depend on the intensity of the local gravitational potential.

$$r_{Bohr} = \frac{\hbar^2 . \sqrt{1 - \frac{v_{electron}{}^2}{c^2}}}{K_{Coulomb} . q^2 . m_{electron}} \ldots\ldots \rightarrow \ldots\ldots . v_{electron} = \sqrt{c^2 \left[1 - \left(\frac{r_{Bohr} . K_{Coulomb} . q^2 . m_{electron}}{\hbar^2} \right)^2 \right]}$$

$1AU. \rightarrow$	$\Phi_{Gravitational} \downarrow$	$r_{Bohr} \downarrow$	$v_{electron} \uparrow$	$Time\ rate \downarrow$	$U \downarrow$	$K \uparrow$
$50AU. \rightarrow$	$\Phi_{Gravitational} \uparrow$	$r_{Bohr} \uparrow$	$v_{electron} \downarrow$	$Time\ rate \uparrow$	$U \uparrow$	$K \downarrow$

Where **U** = the potential energy of the atom, and **K** = the kinetic energy of the atom.

As shown in chapter 4, the electron oscillates between the past and the future, the oscillation being modulated by the intensity of the local gravitational potential, as shown in figure 5. When the potential is low, there is greater influence from an external time reference and the oscillation becomes more difficult, because the tendency is to pull the electron towards the external time reference, reducing the radius of its orbit. When the potential is high – generally in a more isolated location with a less defined local time reference – the opposite occurs, with the electron left freer to assume a larger orbital radius.

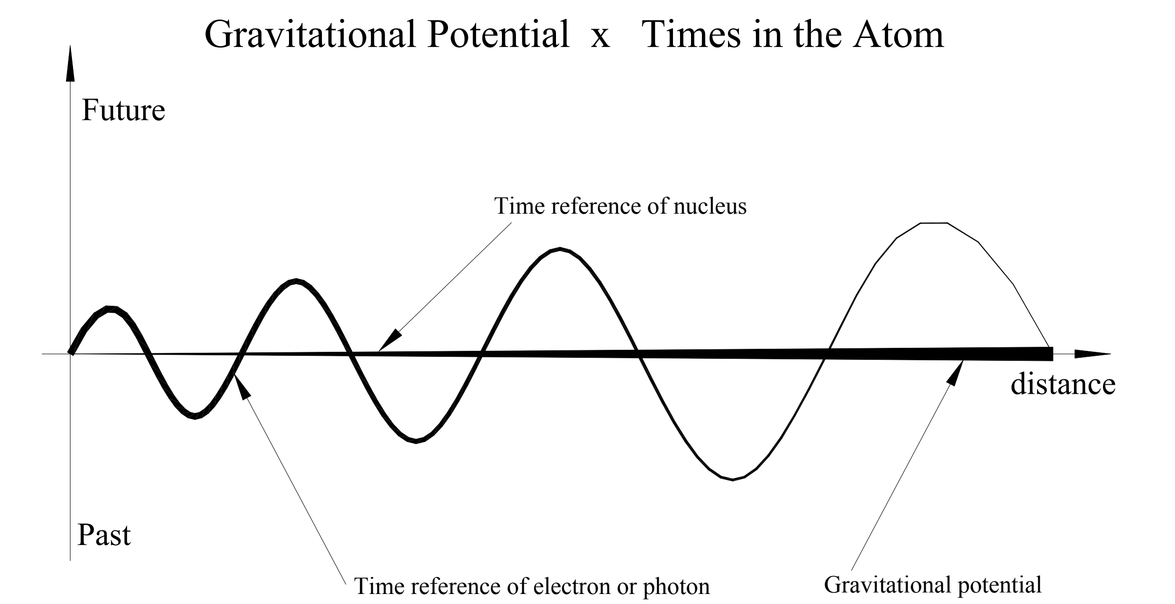

Figure 5

Gravity is a residual force without mass – an acceleration – resulting from the imbalance between the centripetal force and the Coulomb force, where the latter is neutralized electrically. This difference of forces results from a relative mass which is a consequence of the principles of relativity: a mass that exists for the electron but not for the nucleus of the atom.

Given that gravity originates in the Coulomb force, it is no surprise that the two forces vary inversely with the square of distance from the center. It is simpler to understand the difference of their relative intensities knowing that the gravitational field is a small residue, a minute fraction of the electromagnetic force.

Everything indicates that there would be no generation of gravity without the electron cloud and that widely distributed particles do not possess gravity simply on the basis of possessing mass. It can be concluded that only particles in atoms can generate gravity, and that the gravity generated possesses a given location. As shown in figure 6, it has a defined direction, accompanying the electron in its orbit with a small delay proportional to the distance from the nucleus.

" The Gravity of the Atom "

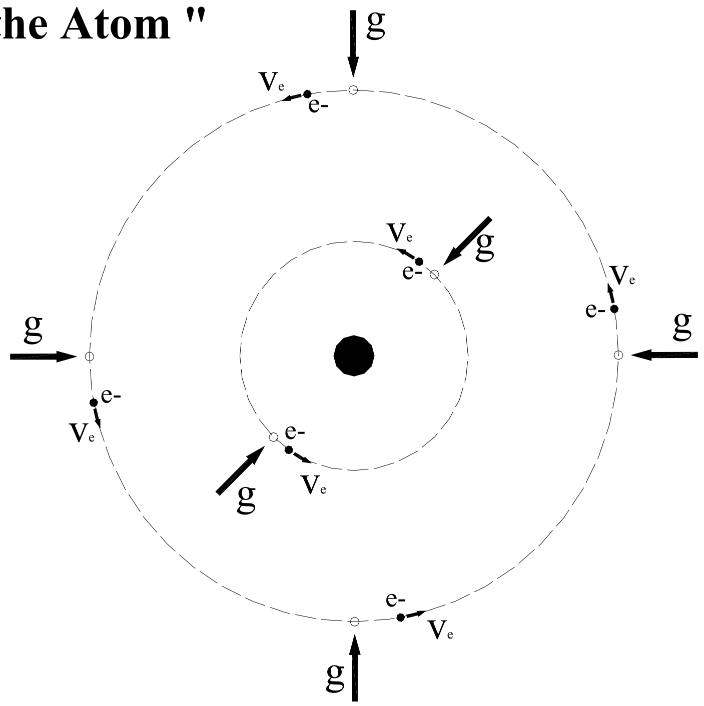

Figure 6

According to Quantum Mechanics, all of the orbits in the electron cloud are quantized. The gravity generated indirectly by each electron is therefore also quantized, with each gravity wave possessing an oscillation bearing the properties of the relevant orbit and moving from its origin at the velocity of light.

One of the principal characteristics of gravity is that it has the property of polarizing time, in our case towards the future. We can say that our direction is that of positive time, and this is what ensures that matter predominates over anti-matter.

When an electron is released from an atomic system such as that in figure 7, it no longer generates its quantum of gravity, and is thus no longer involved in the definition of the local time reference.

" Antimatter of a Universe of two Atoms "

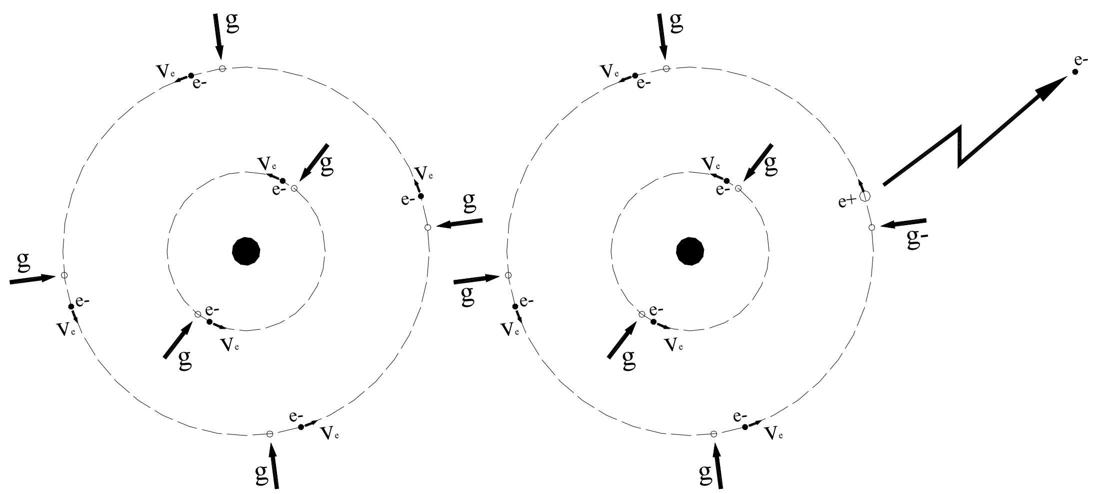

Figure 7

A space is created temporarily in the place of the released electron, possessing the negative gravity or negative energy of a positron or anti-electron. As a consequence, this space is polarized towards the past, or in the direction of negative time. Given that the entire system is polarized towards the future, balance is quickly reestablished.

9. Ghost neutrinos

It is known that matter exchanges energy as if it were a particle and propagates it as if it were a wave. Any dispersed particle (not connected to an atom) will oscillate around its own local time reference, giving it wave characteristics where the amplitude of the oscillation (which, as was seen in the Temporal Uncertainty Principle, is between the past and the future) will be proportional to that which the particle possessed when it was part of an atom, depending on the energy used in its dispersal. Particles may be accelerated by collision or when subject to elevated potentials, thus experiencing an increase in their total energy.

The more energy a particle has, the greater will be its tendency to oscillate around the local time reference. For this reason, dispersed particles with very high energy (figure 8) will have a higher frequency and consequently shorter wavelength.

Particles and there Time Waves

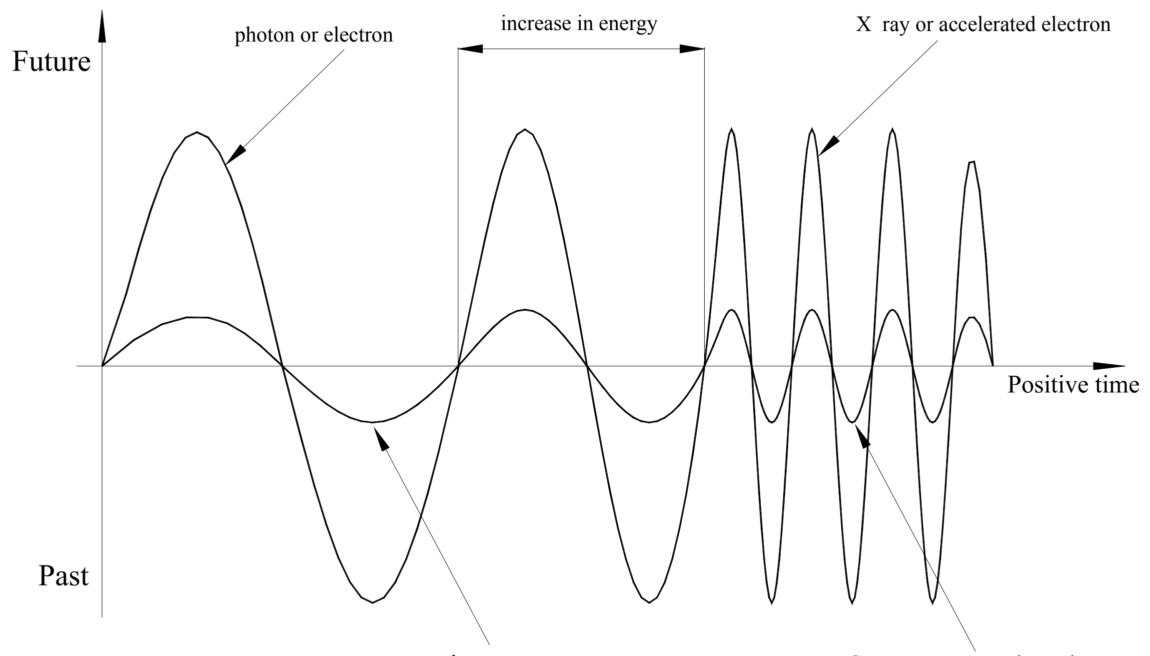

Figure 8

As shown in chapter 6 the intensity of a gravitational field modifies the amplitude of the temporal wave of the stabilized atomic components within it. It is therefore possible that some other phenomenon may modify the temporal oscillation amplitude of neutrinos. We know that they originate in nuclear fusion reactions, where two hydrogen atoms fuse to form a helium atom. During the reaction, the local time references of the atomic nuclei are undefined and there is a small period of violent temporal instability until the new nucleus has defined itself: this is the source of neutrinos, which possess deformed temporal waves resulting from this instability (see figure 9).

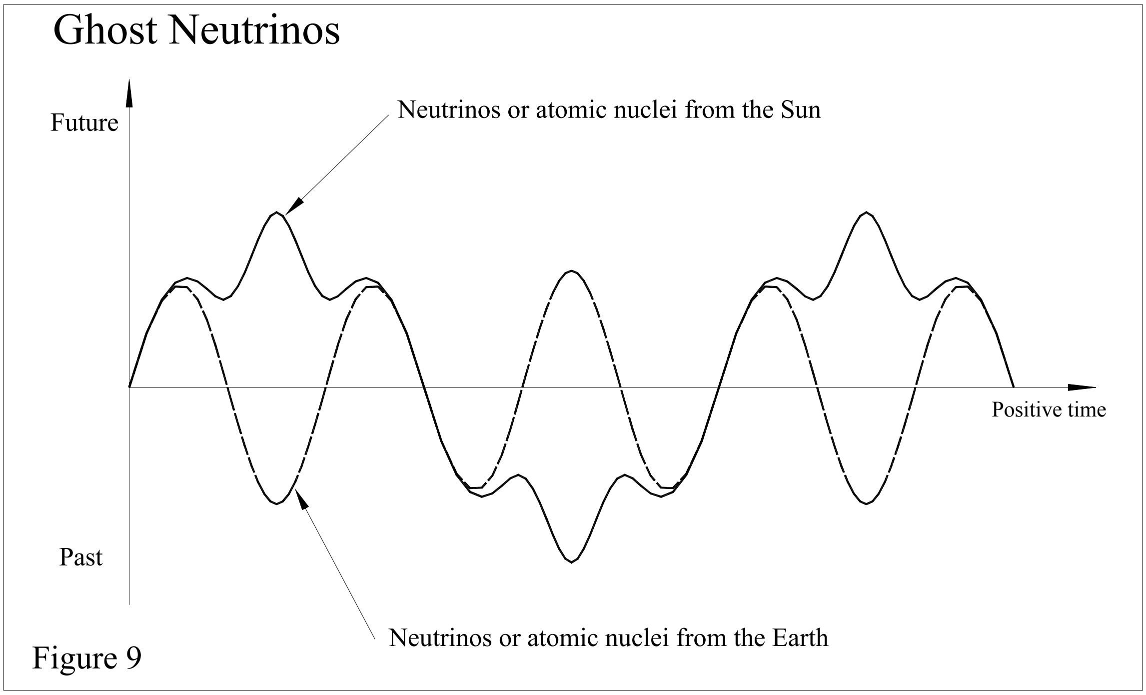

Figure 9

Solar neutrinos can thus not always be temporally identified with nuclei on earth, because the observation or detection systems on earth do not possess the temporal amplitude of the neutrinos originating in the chaotic, high energy reactions that occur in stars. We should also take into account that the location in which the neutrinos originate must have a very different local time reference from the detection locations.

10. The Biefeld-Brown Effect

The Biefeld-Brown effect finds practical application in Lifters, which are strange constructions, usually of a considerable size and with the most varied formats. Lifters are simply large capacitors which float above the ground when subject to strong electrical fields. These capacitors generate an inertia in the direction of the positive pole when subject to a high voltage.

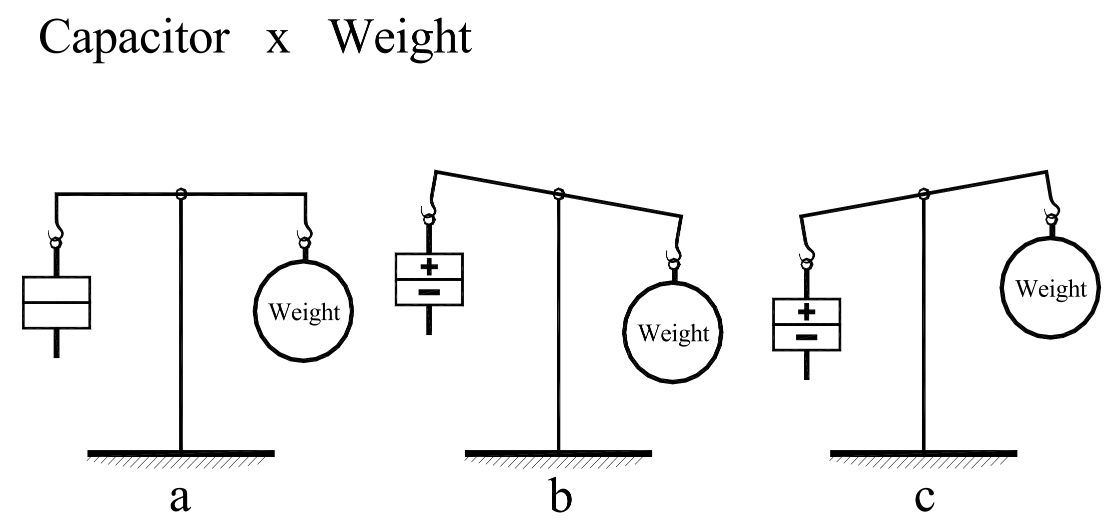

Figure 10

Figure 10 illustrates what happens to this capacitor when balanced against a weight on a scale. In figure 10a, the capacitor is uncharged and the scale is balanced. in figure 10b, the capacitor is charged with the positive pole upwards and its weight is reduced, while in figure 10c, the positive pole is downwards and the weight is increased. The inertia remains until the capacitor is discharged.

Lifters have been studied for some time in a number of experiments. As a result, their geometry and extremely light materials have been optimized to the point where they are able to float or levitate with good stability. Even so, their yield is low, and they are barely able to lift their own weight.

Figure 11 demonstrates how the phenomenon is explained by the Quantum Theory of Gravity. The atoms that form the capacitor dielectric undergo a polarization when subject to a high voltage, and this polarization causes the electrons in the outer shells to be concentrated towards the negative pole, while the nuclei move towards the positive pole.

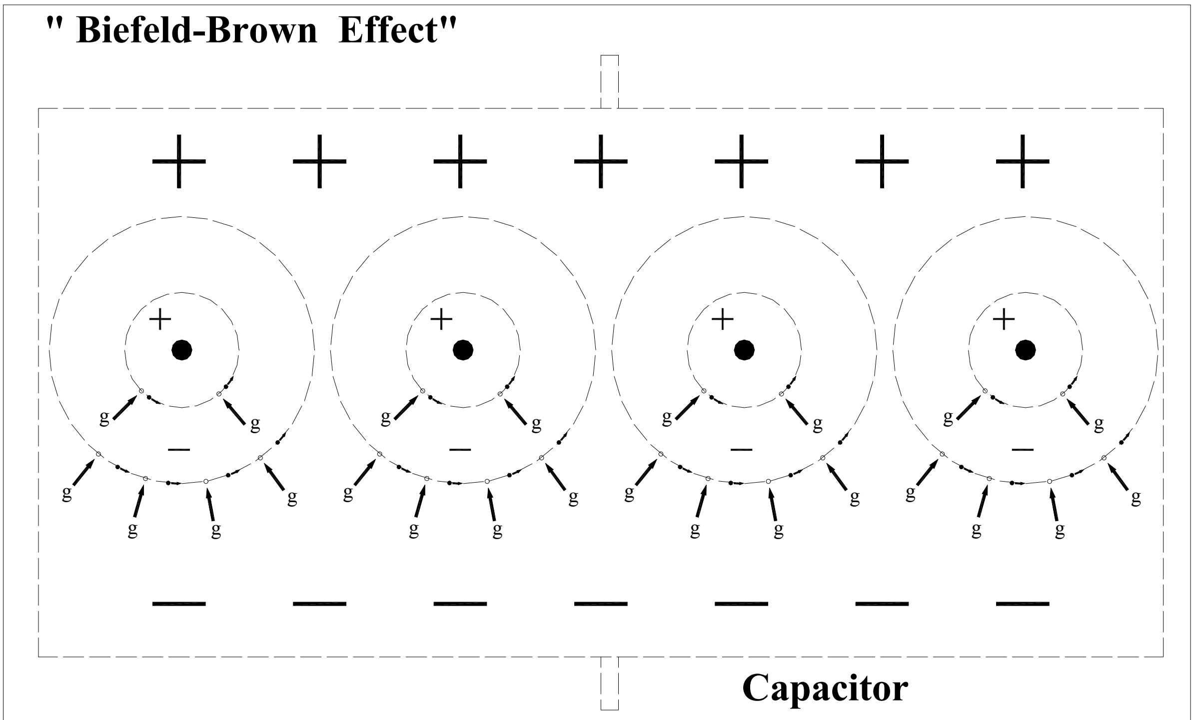

Figure 11

In this polarized state, the orbits of the electrons will be redefined, obeying the new electrical situation to which the system is subject. The gravity vectors will be displaced according to the new orbits, as shown in figure 7 in chapter 8, and the greater concentration of these vectors on one side of the atom will cause the capacitor to experience a small inertia. The extremely low yield of Lifters is explained by the fact that a reduced number of electrons of these atoms take part in the displacement.

11. The superconductor in QTG

According to BCS theory, we know that electrons in superconductors at very low temperatures are associated in pairs known as Cooper pairs. The electrons of a Cooper pair have opposite spin and equal and opposite linear momentum, thus constituting a system with zero spin and zero linear momentum. According to the Quantum Theory of Gravity, this signifies that the electrons are in temporal opposition, with one in the past and the other in the future: these temporal phase shifts compensate for one another, enabling the pair to identify with the local time reference. In this case, each Cooper pair can be represented as if it were a single particle with zero spin, which thus does not obey the Pauli exclusion principle. For this reason, any number of Cooper pairs can occupy the same quantum state.

We know that certain atoms with large nuclei begin to be unstable beyond a certain number of units: a large number of particles causes an increase in the nuclear radius so that the nucleus becomes unstable. This occurs at around atomic number 86 to 90. At this critical radius, the electrostatic force of repulsion is equal to the strong force.

The strong (hadronic) force is the particles' natural tendency to stabilize around the local time reference, or what could be regarded as the local present. All particles oscillate around their local time reference (as shown in chapter 4), or the location where they best identify with the local present, as in the case of electrons that participate in molecular bonds. The amplitude of this oscillation – the degree to which a particle can be in the past or the future in relation to its own local time reference – is related to its mass or energy and to whether it is part of a molecular bond, as shown in figure 12.

In superconducting materials at very low temperatures, certain electrons that are part of molecular bonds are limited in the oscillation amplitude of their quantum orbits. These are fixed in a temporally favorable position, their temporal oscillation severely reduced, as shown in figure 12, to the point of being practically defined at the local time reference of the particles in the heavy atomic nuclei. In superconduction, the attraction force between the electrons that form Cooper pairs is of a similar origin to that of the strong force, because it also occurs with particles of the same electrical charge.

In superconduction, the electrons form pairs in order to compensate for the temporal phase shift they each possess, as shown in figure 13. While one is in the past and the other in the future, as if mirrored, as a pair they are able to position themselves at the local time reference of the nuclei.

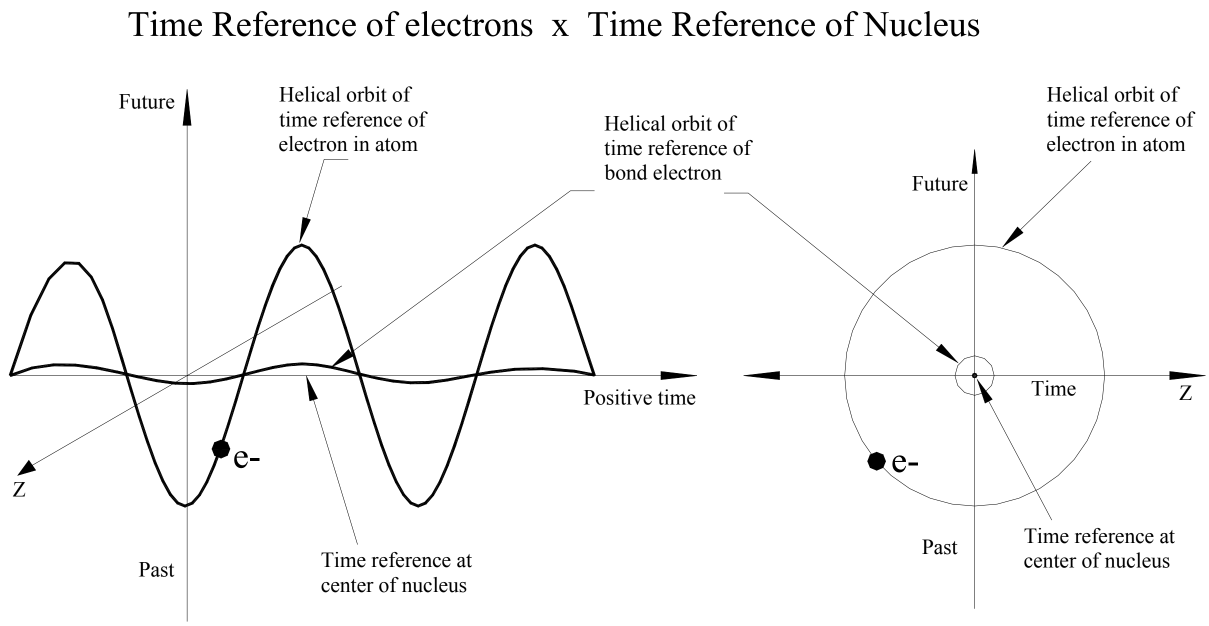

Figure 12

In these conditions, these electrons offer no resistance to motion and can attain relativistic velocities: the resistance of the material tends to zero and the result is superconduction. The collision-free trajectory in the electron cloud in this temporal condition is infinitely large: in a closed circuit, these electrons can remain in motion almost indefinitely.

This mirroring electron is not always located nearby, as can be seen in figure 13, explaining the large distances large distances between the electrons that form the Cooper pairs. The number of superimposed Cooper pairs is what determines the number of quantized orbits that exist for these electrons, which are in a favorable position to identify or interact with the electron that is their “temporal mirror”.

For the electrons of the Cooper pairs to associate themselves as described, they must be in motion at relativistic velocities in order to have their mass dilated in relation to the local time reference, in this case the nucleus. Supposing that the amplitude of the temporal phase shift of the electrons of the Cooper pairs corresponds to the same distance at which the atomic nuclei cease to be stable, we can deduce that these electrons should have a mass identical to that of the protons.

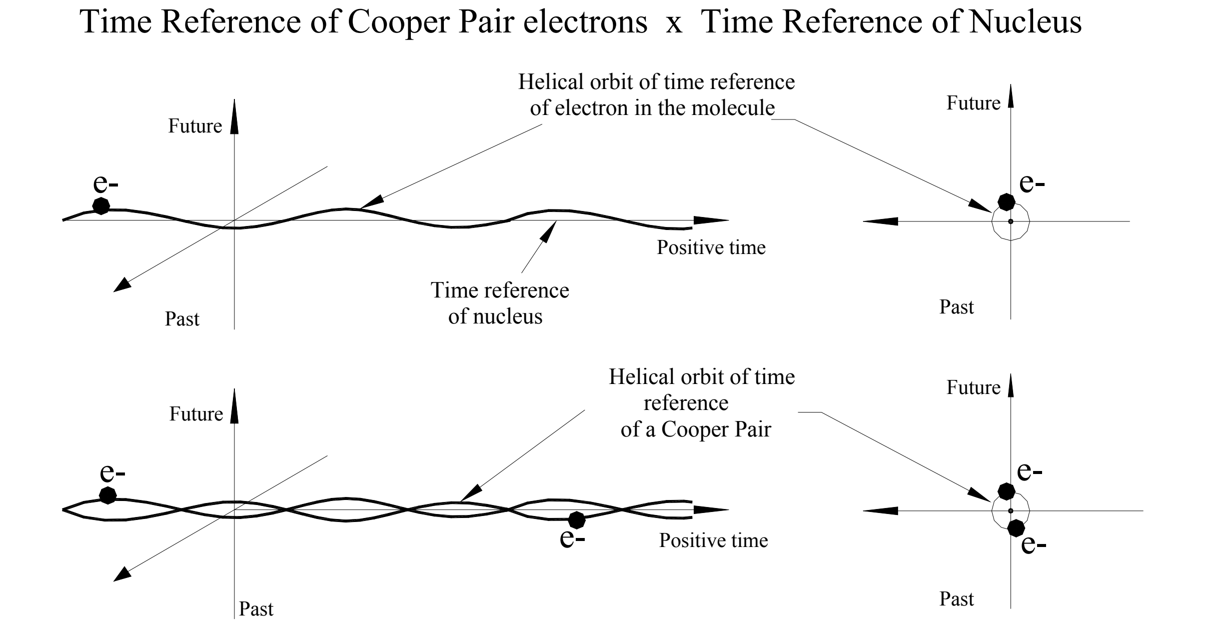

Figure 13

We can therefore calculate the velocity of the electrons in the Cooper pairs using the following equation:

$$v_{electron-SC} = \sqrt{(1 - \frac{{m_e}^2}{x.\,{m_p}^2}).c^2} \quad \left[\frac{m}{s}\right] \quad Eq.53$$

Where

$\upsilon_{electron\text{-}SC}$ is the velocity of the electrons in the superconductor [m/s],

x ranges from 1 to approximately 90 (largest stable atomic number).

Solving, we find:

$\upsilon_{electron\text{-}SC} = \mathbf{c} - 44.46$ m/s. (for x = 1),

$\upsilon_{electron\text{-}SC} = \mathbf{c} - 0.494$ m/s. (for x = 90).

12. The Double Slit Experiment in QTG

The traditional double slit experiment has the chief aim of demonstrating the wave nature of matter. The uncertainty as to which slit the particle passes through is resolved mathematically by Quantum Mechanics through a mysterious combination weighted with complex numbers, by means of which it is accepted that the particle passes simultaneously through both slits. This idea does not sit comfortably with our common sense. Our physical intuition suggests that something is conspiring against reality.

Just as Quantum Mechanics resolves this problem with its Uncertainty Principle, so the Quantum Theory of Gravity resolves it through the Temporal Uncertainty Principle. It has been shown experimentally that the particle collapses at a specific location, passing through just one of the slits. We will see how this choice is conditioned by space-time.

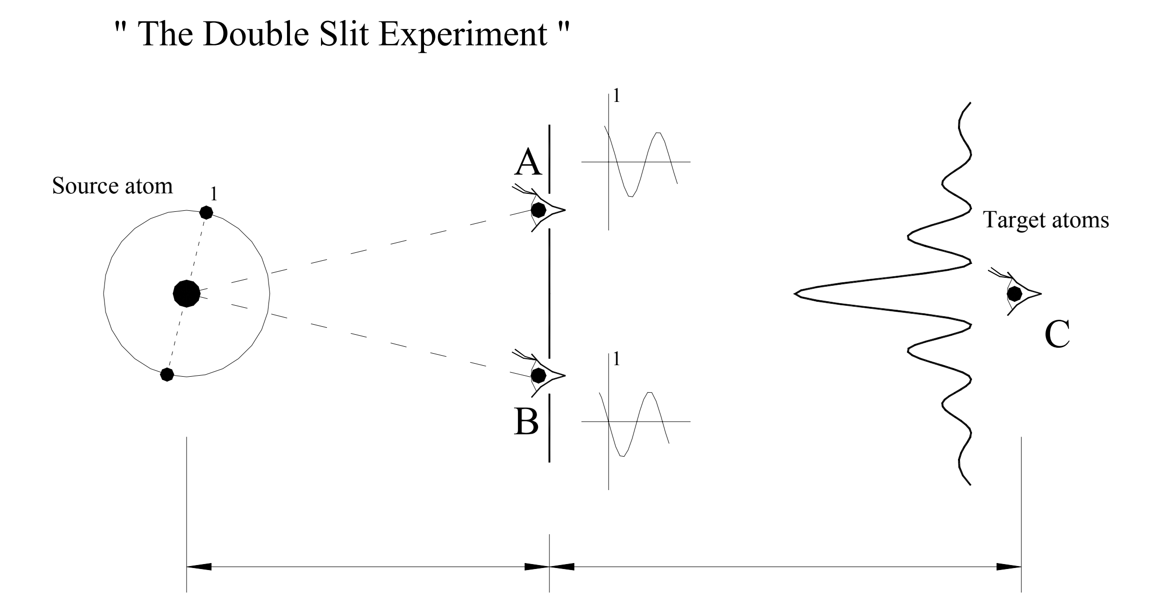

Figure 14

If we imagine each slit as representing an observation system, as seen in chapter 4, each observation system will experience a different temporal wave, as can be seen in figure 14. The interference patterns observed under the wave theory exist in an analogous form for the temporal waves, with the maxima occurring when both waves reach the shield in phase (they must be in phase, because only in this way do they form aspects of the same particle), while the minima occur when the temporal waves are most out of phase. This can be seen in greater detail in figure 15.

" Dispersal analysis in just one atom "

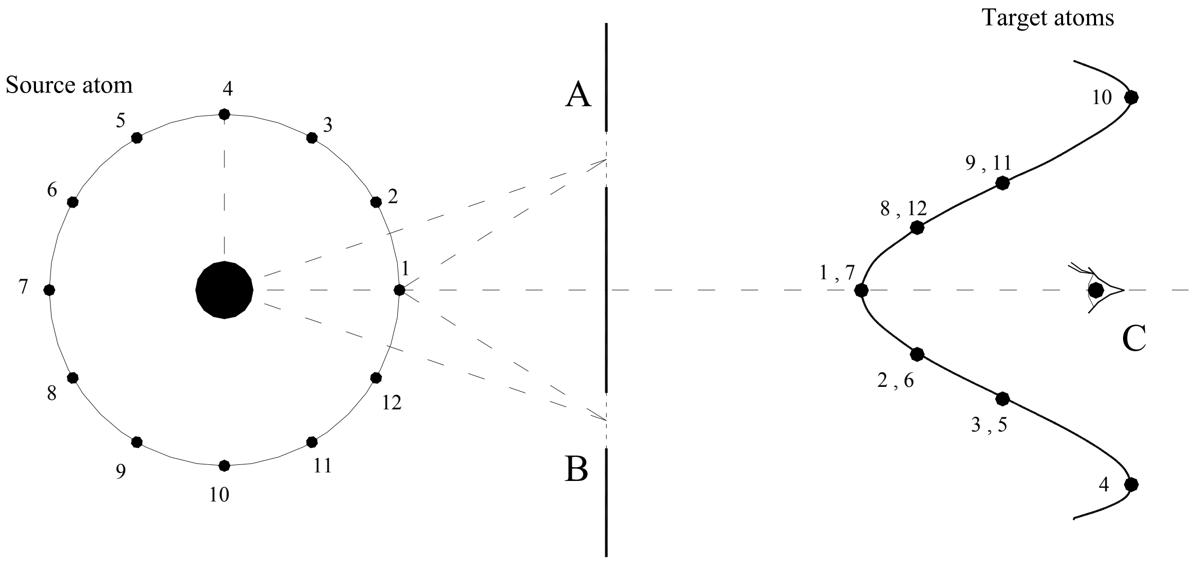

Figure 15

If we construct an experiment using a coherent source such as a laser, we will see more defined interference patterns because the temporal waves will all be in phase and of the same amplitude and wavelength, the particles will always collapse at the same point and we will see lines (or points in two dimensions) instead of the curve shown in figure 15. Imagine, then, a laser that generates a controlled emission of particles – a source emitting one particle at a time at controlled intervals – so that we can follow the formation of the interference patterns in a gradual manner. We will find that, for each particle, well-defined points exist for the collapse, always at the locations – the maxima – established by the wave theory.

We can now follow how the Quantum Theory of Gravity explains the formation of the principal maximum in the interference pattern. Supposing the atom to be aligned with the experimental axis, a photon released from the electron cloud at point 1 (imagining the atom as a sphere in three dimensions) is the same distance from each of the two slits. In this case, the waves reach the shield exactly in phase and exactly at the center of the first maximum. Following the same logic for the other points, we find the interference pattern as presented. The formation of other maxima and minima obeys the same rule: the collapse always occurs where the waves observed by the two observation systems reach the shield in phase, and the maxima occur where the waves are out of phase by one or more full wavelengths.

Looking from observation system C or the shield in figure 14 or 15, what passes through both slits simultaneously is the information regarding the particle's temporal situation, which simultaneously identifies the wave of the particle from the source atom through both slits. The particle's temporal information is defined by observation systems A and B, and if more slits were present, all would necessarily be involved in the identification.

As seen in chapter 8, gravity (and consequently time) begins to exist as of the existence of the second atom, being a result of the influence of one atom on the other. In the case of this experiment, all of the atoms in the location contribute to the formation of a local time reference: when the particle is part of an atom, it will participate directly in the definition of the local time reference, just as it is responsible for its part in the generation of gravity.

Just as Quantum Mechanics and its quantum numbers establishes that these particles within atoms occupy well-defined orbits, so we can imagine that all of the space-time around or between these atoms is somehow quantized, like a three-dimensional grid modulated by gravity-time, a granulated space through which these particles move when not linked to an atom.

It is known that matter exchanges energy as if it were a particle and propagates it as if it were a wave. Any particle not connected to an atom will oscillate within this granulated space around its own local time reference. Its particle nature will appear to collapse while its wave nature will identify temporally with another wave – in this case, with a particle within an atom – perfectly in phase with its temporal oscillation.

We have seen that, in superconductors, the mirroring electron that balances the Cooper pair with respect to the present is not always physically close. Here we have a similar but inverted situation,: the identification of the site of the collapse occurs where the waves are in phase. Both particles must be in the same time dimension, because – having exactly the same oscillation with respect to the local time reference – they are constantly and instantaneously identified as if they were in the same dimension, in the same way that we identify ourselves by what is around us. There will be a great variety of options, but they must be within the locations determined by the wave theory. It is for this reason that the location of the particle collapse is determined at the source or point of release, which will result in a target in the same time dimension and offering the best geometrical conditions. In this way, the interaction will involve the least possible energy, which, as seen in chapter 3, is the natural condition for the stability of any physical system or interaction.

It has been shown experimentally that quantum information can be transmitted at velocities greater than that of light. This is now easier to accept, if we take into account that particles can be out of phase with the present.

We have shown that there is a mysterious instantaneous complicity in the existence of all of the matter in the universe. One particle, such as a photon, released in any part of the cosmos, travels in all directions simultaneously, but – independently of how many billions of years passed in its motion – will collapse only in a certain location defined at its release. This remarkable fact means that the future, the present and the past are already defined, and I can only attribute this fantastic power to a powerful divine governor.